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Etudes de glaciers et de calotte glacieres avec l'interferometrie radar spatiale.

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Glacier and ice shelves studies using satellite SAR interferometry.

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Satellite **radar interferometry** is a powerful technique to measure the surface velocity and topography of **glacier** ice. On ice shelves, a quadruple difference technique separates tidal motion from the steady creep flow deformation of ice. The results provide a wealth of information about glacier grounding lines, mass fluxes, stability, elastic properties of ice, and tidal regime. The grounding line, which is where the glacier detaches from its bed and becomes afloat, is detected with a precision of a few tens of meters. Combining this information with satellite radar altimetry makes it possible to measure glacier discharge into the ocean and state of mass balance with greater precision than ever before, and in turn provide a significant revision of past estimates of mass balance of the Greenland and Antarctic Ice Sheets. Analysis of creep rates on floating ice permits an estimation of basal melting at the ice shelf underside. The results reveal that the action of ocean water in sub-ice-shelf cavities has been largely underestimated by oceanographic models and is the dominant mode of mass release to the ocean from an ice shelf. Precise mapping of grounding line positions also permits the detection of grounding line migration, which is a fine indicator of glacier change, independent of our knowledge of snow accumulation and ice melting. This technique has been successfully used to detect the rapid retreat of Pine Island Glacier, the largest ice stream in West Antarctica. Finally, tidal motion of ice shelves measured interferometrically provides a modern, synoptic view of the physical processes which govern the formation of tabular icebergs in the Antarctic.

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